

State of California
STATE WATER RESOURCES CONTROL BOARD

DRAFT

WATER QUALITY CONTROL POLICY
FOR GUIDANCE ON
ASSESSING CALIFORNIA SURFACE WATERS

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This is a draft document and is subject to revision.

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WATER QUALITY CONTROL POLICY FOR GUIDANCE ON ASSESSING CALIFORNIA SURFACE WATERS

1 Introduction

This State policy for water quality control (Policy) describes the process by which the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) shall comply with the reporting and listing requirements of sections 303(d) and 305(b) of the federal Clean Water Act (CWA). The goal of this Policy is to establish a standardized approach for assessing the surface waters of the State.

CWA section 303(d) requires states to identify waters that do not meet applicable water quality standards¹ after the application of certain technology-based controls. CWA section 305(b) requires the State to report to U.S. Environmental Protection Agency (USEPA) on the State's water quality. USEPA guidance recommends integrating these federal requirements. This Policy includes components of California's Integrated Water Quality Report and guidance on development of the CWA section 303(d) list of water quality limited segments [section 303(d) list] pursuant to Water Code section 13191.3(a).

The methodology to be used to develop the section 303(d) list [40 CFR 130.7(b)(6)(i)] is established by this Policy and includes:

- the structure of the Integrated Water Quality Report;
- California Listing Factors and De-listing Factors;
- the process for evaluation of readily available data and information; and
- Total Maximum Daily Load (TMDL) priority setting and scheduling.

This Policy applies only to the listing process methodology used to comply with CWA sections 303(d) and 305(b). In order to make decisions regarding standards attainment, this Policy provides guidance to interpret data and information by comparison to beneficial uses, existing numeric and narrative water quality objectives, and antidegradation considerations.² The Policy shall not be used to:

- determine compliance with any permit or waste discharge requirement provision;
- establish, revise, or refine any water quality objective or beneficial use; or
- translate narrative water quality objectives for the purposes of regulating point sources.

Every water quality standard exceedance deserves an appropriate response. However, because resources are limited, SWRCB and RWQCBs must use all cost effective means to address standards that are not met. It is the policy of SWRCB that significant water quality standard exceedances be reported in the California Integrated Water Quality Report.

2 The California Integrated Water Quality Report

The SWRCB, in coordination with the RWQCBs, shall develop California's Integrated Water Quality Report. California's Integrated Water Quality Report³ shall identify each of the state's waters by category and describe the water quality of each water body by comparison to applicable water quality standards. The integrated report shall also contain a 2-year schedule for completion of TMDLs, priority ranking, and the analysis required by CWA section 305(b).

In order to comply with CWA sections 303(d) and 305(b), the integrated report shall be divided into two sections. The first section is structured to assess whether water quality standards are being met (section 3.1). This is accomplished by determining whether there is sufficient data and information to conclude that water quality standards are being attained. The planning list contains waters where some data and information are available but the data and information are insufficient to conclude that water quality standards are not attained. Waters not meeting standards shall be placed on the section 303(d) list unless: (1) a TMDL has been completed, (2) other pollution control measures are in place, or (3) documented impacts are not caused by a pollutant.

The second section addresses several CWA section 305(b) requirements (section 3.2). This section contains the standards fully attained list, standards partially attained list, and the monitoring list. Waters on the standards fully attained list attain all standards. The standards partially attained list is comprised of waters for which one or more standards are attained and data and information related to other standards are insufficient to determine attainment. Waters shall be placed on the monitoring list if there is no data or information to determine if water quality standards are met.

3 Structure of the Integrated Report⁴

This section contains the categories of waters to be included in the Integrated Report. Sections 4 and 5 contain the factors that shall be used to add and remove waters from the categories presented below.

The California Integrated Water Quality Report shall present categories of waters for placement in the following list categories:

3.1 Waters that do not meet or potentially do not meet water quality standards

3.1.1 Planning List

Waters shall be placed on this list if some data and information are available but are insufficient to allow a determination whether water quality standards are attained. Water segments shall be listed in this category when the data or information to support an attainment determination for any water quality standard is only partially available, consistent with the requirements of the California Listing Factors.

Waters in this category exceed applicable water quality objectives infrequently, have too few samples to confidently assess that standards are exceeded, or lines of evidence contradict one another.

Waters on this list shall be scheduled for monitoring to determine if water quality standards or beneficial uses are not attained. The waters on the Planning List have high priority for monitoring before the next section 303(d) list is completed. The Planning List shall be the rationale used by the RWQCBs to obtain the needed monitoring (1) from responsible parties on a voluntary basis, (2) using Water Code section 13267 and 13225 authorities, and (3) as a last resort, using state funds identified for this purpose.

3.1.2 Section 303(d) List of Water Quality Limited Segments

Waters shall be placed on this list if the water quality standard is not attained, the standards nonattainment is due to a pollutant or pollutants, and remediation of the standards attainment problem requires a TMDL.

This category constitutes the section 303(d) list of water quality limited segments for which one or more TMDL(s) are needed. A water segment shall be listed in this category if it is determined, in accordance with the California Listing Factors, that a pollutant has caused or is suspected of causing standards to not be attained.

Where more than one pollutant is associated with the standards not attained for a single water segment, the water segment shall remain on the section 303(d) list until TMDLs for all pollutants have been completed, are approved by USEPA, and an implementation plan is adopted.

3.1.3 Water Quality Standards are not met but the development of a TMDL is not required

3.1.3.1 TMDLs Completed List

Water segments shall be listed in this subcategory once a TMDL has been developed and approved by the U.S. Environmental Protection Agency (USEPA) and that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the listed water body, the water body shall remain on the section 303(d) list until all TMDLs for each pollutant have been completed and approved by USEPA.

To track implementation of TMDL(s), monitoring must be scheduled for these water segments to verify that the water quality standard is met once the water quality management actions needed to achieve all TMDLs are implemented.

3.1.3.2 Enforceable Program List

Water segments shall be listed in this category if pollution control requirements other than TMDLs are reasonably expected to result in the attainment of the water quality standard in the near future. Consistent with 40 CFR 130.7(b)(1)(i), (ii), and (iii), water segments shall be listed in this subcategory when other pollution control requirements required by local, state, or federal authority are stringent enough to implement water quality standards applicable to such waters.

Waters on this list shall be scheduled for monitoring as part of the enforceable program to verify that the water quality standard is attained as expected.

3.1.3.3 Pollution⁵ List

Water segments shall be listed in this subcategory if beneficial uses are impacted but the impact is not caused by a pollutant.

Water quality-related problems to be placed on this list include but are not limited to: aquatic nuisance species; habitat modification (e.g., loss of riparian habitat); channel modification; flow modification (e.g., reduced stream flow or water diversion); and other water quality-related problems caused by pollution.

These waters may be scheduled for monitoring to confirm that there continues to be no pollutant-caused impairment and to support water quality management actions.

3.2 Waters that meet water quality standards or no data available

3.2.1 Standards Fully Attained List

Water bodies in this category attain all water quality standards. Water segments shall be listed in this category if data and information demonstrate the requirements presented in the California Listing Factors are met and data and information support a determination that all water quality standards are attained. To be placed on this list, data must be available showing attainment of all standards.

Waters on this list may be scheduled for periodic monitoring to confirm that the waters are still clean.

3.2.2 Standards Partially Attained List

Waters in this category attain some water quality standards. Data and information are insufficient to determine if the remaining water quality standards are attained. Waters shall be listed in this category if there are data and information, which meet the requirements of the California Listing Factors, to support a determination that some, but not all, standards are attained. Attainment status of the remaining standards is not known because there is insufficient data or information available.

Monitoring may be scheduled for these waters to determine if the standards previously found to be in attainment remain in attainment, and to determine the attainment status of those water quality standard for which data and information was previously insufficient to make a determination.

3.2.3 Monitoring List

Waters shall be placed on this list if there is no data and information to determine if water quality standards are attained. The development of this list shall be completed on the same schedule as the rotating basin monitoring conducted by the Surface Water Ambient Monitoring Program (SWAMP).

4 California Listing Factors

RWQCBs and SWRCB shall use the following factors to develop the California Integrated Water Quality Report. SWRCB is required by the Supplemental Report of the 2001 Budget Act to use a weight of evidence approach⁶ in developing a policy for listing and de-listing waters and to include criteria that ensure that the data and information used are accurate and verifiable.

The factors for placement of water segments on the lists are presented below.

4.1 Planning List Factors

This section provides the methodology for developing the planning list. Waters that satisfy the conditions for placement on the section 303(d) list shall not be placed on the planning list except as allowed by section 4.2.6. Waters need not be placed on the planning list before placement on the section 303(d) list.

Except as allowed by sections 7.1 and 7.2.5.2, only the most recent data and information (up to 10-years⁷ old) shall be used. Data shall be appropriately transformed as described in section 7.2.5.9 depending on the averaging period stated in the water quality objective or criterion. Water segments shall be placed on this list if any of the following conditions are met:

4.1.1 Numeric Water Quality Objectives or Criteria for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded in 10 percent of the sample population with a confidence level of 80 percent⁸ using a binomial distribution⁹ (Table 4.1). For sample populations less than 10, when 3 or more samples exceed the water quality objective, the segment shall be placed on the planning list.

4.1.2 Numeric Water Quality Objectives for Conventional Pollutants in Water

Numeric water quality objectives for conventional pollutants are exceeded in 10 percent of the sample population with a confidence level of 80 percent using a binomial distribution (Table 4.1). For sample populations less than 10, when 3 or more samples exceed the water quality objective, the segment shall be placed on the planning list.

4.1.3 Numeric Water Quality Objectives or Standards for Bacteria Where Recreational Uses Apply¹⁰

In the absence of site-specific exceedance frequency, bacteria water quality standards are exceeded in 10 percent of the sample population with a confidence level of 80 percent using a binomial distribution (Table 4.1). The minimum sample size is 10. The site-specific exceedance frequency shall be the number of water quality standard exceedances in a relatively unimpacted watershed. To the extent possible, RWQCBs shall identify one or more reference beaches or water segments in a relatively unimpacted watershed to compare to measurements.

For bacterial measurements from coastal beaches, if water quality monitoring was conducted April 1 through October 31 only, a 4 percent exceedance frequency shall be used.¹¹ The length of beach listed shall be 50 yards on each side of the discharge point or, if no source is known, 50 yards on each side of the sampling location. Stations shall be either grouped into one listing or listed separately. For streams and rivers, the estimated length impacted shall cover the entire segment identified.

Data from all monitoring stations shall be used in the assessment of a segment. In reporting the spatial characteristics of the sample location, RWQCBs shall describe the sample location distance from storm drains or other discharge points, if known, in the water body fact sheet.

4.1.4 Beach Postings and Closures

The local environmental health agency having jurisdiction has posted or closed the beach within the most recent 5-year period. Permanent postings not backed by water quality data shall not be considered for placement on the planning list. Postings or closures made in response to a known spill shall not be used as a basis for placement of a water on the planning list.

4.1.5 Health Advisories

A health advisory against the consumption of edible resident organisms or a shellfish harvesting ban has been issued by the Office of Environmental Health Hazard Assessment or Department of Health Services and there is a designated or existing fish consumption beneficial use for the segment.

4.1.6 Bioaccumulation of Pollutants in Aquatic Life Tissue

The tissue pollutant levels of organisms in at least two samples collected from a segment exceed levels satisfying the requirements presented in section 7.2.3.

Acceptable tissue concentrations are measured either as muscle tissue or whole body residues. Residues in liver tissue alone are not considered a suitable measure. Organisms can either be transplanted (if a resident species) or collected from resident populations.

4.1.7 Water/Sediment Toxicity

The water segment exhibits water or sediment toxicity in at least two samples that are significantly statistically different from observed reference conditions. Reference conditions include laboratory controls (using a t-test or other applicable statistical test), the lower confidence interval of the reference envelope, or, for sediments, response less than 90 percent of the minimum significant difference for each specific test organism.

Appropriate reference and control measures must be included in the toxicity testing. Acceptable methods include, but are not limited to: those listed in water quality control plans or the methods used by Surface Water Ambient Monitoring Program (SWAMP), the Southern California Bight Projects of the Southern California Coastal Water Research Project, American Society for Testing and Materials (ASTM), U.S. Environmental

Protection Agency, the Regional Monitoring Program of the San Francisco Estuary Institute, and the Bay Protection and Toxic Cleanup Program (BPTCP).

4.1.8 Nuisance

The water segment exhibits a nuisance condition. Qualitative visual assessments or other semi-qualitative assessments may be used to support placement on the planning list for water odor, taste, excessive algae growth, foam, turbidity, flow, oil, litter or trash, and color.

4.1.9 Adverse Biological Response

A water segment exhibits adverse biological response as compared to reference conditions measured in resident individuals. Endpoints for this factor include reduction in growth, reduction in reproductive capacity, abnormal development, histopathological abnormalities, and other adverse conditions.

Growth Measures: Reductions in growth can be determined using suitable measurements of field populations.

Reproductive Measures: Reductions in viability of eggs or offspring, or reductions in fecundity. Suitable measures include: pollutant concentrations in tissue, sediment, or water which have been demonstrated in laboratory tests to cause reproductive impairment, or significant differences in viability or development of eggs between reference and test sites.

Abnormal Development: Can be determined using measures of physical or behavioral disorders or aberrations.

Histopathology: Abnormalities representing distinct adverse effects, such as carcinomas or tissue necrosis, must be evident.

Qualitative visual assessments or other semi-qualitative assessments may be used to support placement on the planning list for repeated fish kills or repeated bird kills related to water quality conditions.

4.1.10 Degradation of Biological Populations and Communities

A water segment exhibits significant degradation in biological populations and/or communities as compared to reference site(s). This condition requires diminished numbers of species or individuals of a single species or other metrics when compared to reference site(s). The analysis should rely on measurements from at least two stations.

4.1.11 Trends in Water Quality

A water segment exhibits concentrations of pollutants or water body conditions for any listing factor and shows a trend of declining beneficial use support or water quality standards attainment. Water quality objectives need not be exceeded to satisfy this listing factor.

4.1.12 Alternate Data Evaluation

For data (or aspects of data such as measurement magnitude) not explicitly addressed in section 4.1, waters shall be placed on the planning list providing that:

- The data and information can be compared to applicable water quality objectives, water quality criteria, or numeric guidelines (section 7.2.3) using a scientifically defensible procedure.
- Measurements have been analyzed using procedures that are scientifically defensible.

Table 4.1: Minimum number of measured exceedances needed to place a water segment on the planning list with at least 80% confidence that the actual exceedance rate is greater than or equal to 10 percent.

| Sample sizes | | Place on planning list if at least this number of exceedances | Sample sizes | | Place on planning list if at least this number of exceedances |
|--------------|-----|---|--------------|-----|---|
| From | To | | From | To | |
| 10 | 15 | 3 | 246 | 255 | 30 |
| 16 | 23 | 4 | 256 | 264 | 31 |
| 24 | 31 | 5 | 265 | 273 | 32 |
| 32 | 39 | 6 | 274 | 282 | 33 |
| 40 | 47 | 7 | 283 | 292 | 34 |
| 48 | 56 | 8 | 293 | 301 | 35 |
| 57 | 65 | 9 | 302 | 310 | 36 |
| 66 | 73 | 10 | 311 | 320 | 37 |
| 74 | 82 | 11 | 321 | 329 | 38 |
| 83 | 91 | 12 | 330 | 338 | 39 |
| 92 | 100 | 13 | 339 | 348 | 40 |
| 101 | 109 | 14 | 349 | 357 | 41 |
| 110 | 118 | 15 | 358 | 367 | 42 |
| 119 | 126 | 16 | 368 | 376 | 43 |
| 127 | 136 | 17 | 377 | 385 | 44 |
| 137 | 145 | 18 | 386 | 395 | 45 |
| 146 | 154 | 19 | 396 | 404 | 46 |
| 155 | 163 | 20 | 405 | 414 | 47 |
| 164 | 172 | 21 | 415 | 423 | 48 |
| 173 | 181 | 22 | 424 | 432 | 49 |
| 182 | 190 | 23 | 433 | 442 | 50 |
| 191 | 199 | 24 | 443 | 451 | 51 |
| 200 | 208 | 25 | 452 | 461 | 52 |
| 209 | 218 | 26 | 462 | 470 | 53 |
| 219 | 227 | 27 | 471 | 480 | 54 |
| 228 | 236 | 28 | 481 | 489 | 55 |
| 237 | 245 | 29 | 490 | 499 | 56 |
| | | | 500 | 500 | 57 |

For samples greater than 500, the number of exceedances to place waters on the Planning list shall be calculated using the following equation: Excel® function CRITBINOM(Number of samples, 0.10, 0.80) + 1.

4.2 Section 303(d) List of Water Quality Limited Segments Factors

This section provides the methodology for developing the section 303(d) list. Data and information collected during a known spill or violation of an effluent limit in a permit or waste discharge requirement (WDR) shall not be used in the assessment of objectives and beneficial use attainment. If standards exceedances reflect physical alteration of the water body that cannot be controlled or natural background conditions, the water segment shall not be placed on the section 303(d) list. Except as allowed by sections 7.1 and 7.2.5.2, only the most recent data and information (up to 10-years old) shall be used. Data shall be appropriately transformed as described in section 7.2.5.9 depending on the averaging period stated in the water quality objective or criterion.

Water segments shall be placed on the section 303(d) list if any of the following conditions are met:

4.2.1 Numeric Water Quality Objectives and Criteria for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution¹² (Table 4.2). For sample populations less than 20, when 5 or more samples exceed the water quality objective, the segment shall be listed.¹³

4.2.2 Numeric Water Quality Objectives for Conventional Pollutants in Water

Numeric water quality objectives for conventional pollutants are exceeded in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 4.2). For sample populations less than 20, when 5 or more samples exceed the water quality objective, the segment shall be listed.

For depressed dissolved oxygen, if measurements of dissolved oxygen taken over the day (diel) show low concentrations in the morning and sufficient concentrations in the afternoon, then it shall be assumed that nutrients are responsible for the observed dissolved oxygen concentrations. In the absence of diel measurements, concurrently collected measurements of nutrient concentration shall be assessed as described in section 4.2.1 to applicable and appropriate water quality objectives or acceptable evaluation guidelines (section 7.2.3).

4.2.3 Numerical Water Quality Objectives or Standards for Bacteria Where Recreational Uses Apply¹⁴

In the absence of a site-specific exceedance frequency, bacteria water quality standards are exceeded in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 4.2). For sample populations less than 20, when 5 or more samples exceed the water quality objective the segment shall be listed.

For bacterial measurements from coastal beaches, if water quality monitoring was conducted April 1 through October 31 only, a 4 percent exceedance percentage shall be used.¹⁵

If the exceedance is due to a beach closure related to a sewage spill, the water segment shall not be placed on the section 303(d) list. Beach postings that are not backed by water quality data shall not be used to support placement of a water segment on the section 303(d) list.

4.2.4 Health Advisories

The water segment satisfies the conditions of section 4.1.5 (health advisory issued) and water segment-specific data are available indicating the evaluation guideline for tissue is exceeded.

4.2.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

The tissue pollutant levels in organisms exceed a pollutant-specific evaluation guideline satisfying the requirements of section 7.2.3 in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 4.2). For sample populations less than 10, when 3 or more samples exceed the evaluation guideline, the segment shall be listed.¹⁶

Acceptable tissue concentrations are measured either as muscle tissue or whole body residues. Residues in liver tissue alone are not considered a suitable measure. Animals can either be transplanted (if a resident species) or collected from resident populations.

4.2.6 Water/Sediment Toxicity

The water segment exhibits water or sediment toxicity that is significantly statistically different from reference conditions (section 4.1.7) in 10 percent of the samples with a confidence of 90 percent using a binomial distribution (Table 4.2) and the toxicity is associated with a pollutant or pollutants. For sample populations less than 10, when 3 or more samples exhibit toxicity, the segment shall be listed if the observed toxicity is associated with a pollutant or pollutants. Waters may be placed on the section 303(d) list for toxicity alone. If the pollutant has not been identified, the water shall also be placed on the planning list (sections 3.1.1 and 4.1) and studies identifying the pollutant causing or contributing to the toxicity shall be completed prior to the development of a TMDL.

Association of pollutant concentrations with effect shall be determined by any one of the following:

- A. Sediment quality guidelines (satisfying the requirements of section 7.2.3) are exceeded in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 4.2). For sample populations less than 10, when 3 or more samples exceed the evaluation guideline, the segment shall be listed. In addition, using rank correlation, the observed effects are correlated with measurements of chemical concentration in sediments. If these conditions are met, the pollutant shall be identified as "sediment pollutant(s)."
- B. For sediments, an evaluation of equilibrium partitioning or other type of toxicological response that identifies the pollutant that may cause the observed impact.

- C. Completion of an evaluation (such as a toxicity identification evaluation) that identifies the pollutant that caused the observed impact.

4.2.7 Nuisance

The water segment satisfies the conditions of section 4.1.8 (visual assessment of nuisance condition) and associated numerical water or sediment data meets any one of the following:

4.2.7.1 Nutrient-related

For excessive algae growth, unnatural foam, odor, and taste, applicable numeric nutrient water quality objectives are exceeded as described in section 4.2.1.

4.2.7.2 Other Types

An applicable numerical water quality objective or acceptable evaluation guideline is exceeded as described in section 4.2.1 for taste, color, oil sheen, turbidity, litter, trash, and odor not related to nutrients. These types of nuisance may also be placed on the section 303(d) list when there is significant nuisance condition when compared to reference conditions.

4.2.8 Adverse Biological Response

The water segment satisfies the conditions described in section 4.1.9 (adverse biological response) and associated water or sediment concentrations of pollutants as described in section 4.2.6.

For adverse biological response related to sedimentation, the water segment shall be placed on the section 303(d) list if the conditions described in section 4.1.9 are satisfied and effects are associated with clean sediment loads in water or those stored in the channel. Waters shall be placed on the section 303(d) list if evaluation guidelines (satisfying the conditions of section 7.2.3) are exceeded in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 4.2). For sample populations less than 20, when 5 or more samples exceed the water quality objective, the segment shall be listed.

4.2.9 Degradation of Biological Populations and Communities

The water segment satisfies the conditions described in section 4.1.10 (aquatic life population and community degradation) and associated water or sediment concentrations of pollutants as described in section 4.2.6.

For population or community degradation related to sedimentation, the water segment shall be placed on the section 303(d) list if the conditions described in section 4.1.10 are satisfied and effects are associated with clean sediment loads in water or those stored in the channel. Waters shall be placed on the section 303(d) list if evaluation guidelines (satisfying the conditions of section 7.2.3) are exceeded in 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 4.2). For sample populations less than 20, when 5 or more samples exceed the water quality objective, the segment shall be listed.

4.2.10 Trends in Water Quality¹⁷

A water segment exhibits concentrations of pollutants or water body conditions for any listing factor that shows a trend of declining water quality standards attainment.

Numeric, pollutant-specific water quality objectives need not be exceeded to satisfy this listing factor.

In assessing trends in water quality RWQCBs shall:

1. Use data collected for at least three years;
2. Establish specific baseline conditions;
3. Specify statistical approaches used to evaluate the declining trend in water quality measurements;
4. Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate; and
5. Determine the occurrence of adverse biological response (section 4.1.9), degradation of biological populations and communities (section 4.1.10), or toxicity (section 4.2.6).

Waters shall be placed on the section 303(d) list if the declining trend in water quality is substantiated (steps 1 through 4 above) and impacts are observed (step 5).

4.2.11 Alternate Data Evaluation

For data (or aspects of data such as measurement magnitude) not otherwise addressed in section 4.2 or for situations where an individual line of evidence would not support the placement of a water on the section 303(d) list, waters may be placed on the section 303(d) list if water quality objectives are exceeded providing the RWQCB justifies in the water body fact sheet the decision to list. At a minimum the justification must demonstrate:

- The data and information are related to a pollutant or toxicity.
- The data and information meet quality assurance requirements (section 7.2.4).
- The measurements can be analyzed using a scientifically defensible procedure that provides an equivalent level of confidence as the listing factors in section 4.2.
- The data and information can be compared to applicable water quality objectives, water quality criteria, or numeric guidelines (section 7.2.3).
- The magnitude of the water quality objective or water quality criterion exceedance shall be considered, if appropriate.
- Corroborating evidence from independent lines of evidence show narrative water quality standards are not attained.

RWQCBs may use an alternate exceedance frequency, if justified. Justification may include, but is not limited to:

- site-specific study that identifies an applicable exceedance frequency.
- significance of the water body (e.g., Outstanding National Resource Water, State Water Quality Protection Area, etc.).

| Table 4.2: Minimum number of measured exceedances needed to place a water segment on the section 303(d) list with at least 90% confidence that the actual exceedance rate is greater than or equal to 10 percent | | | | | |
|--|-----|---|--------------|-----|---|
| Sample sizes | | Place on the section 303(d) list if at least this number of exceedances | Sample sizes | | Place on the section 303(d) list if at least this number of exceedances |
| From | To | | From | To | |
| 10 | 11 | 3 | 245 | 253 | 32 |
| 12 | 18 | 4 | 254 | 262 | 33 |
| 19 | 25 | 5 | 263 | 270 | 34 |
| 26 | 32 | 6 | 271 | 279 | 35 |
| 33 | 40 | 7 | 280 | 288 | 36 |
| 41 | 47 | 8 | 289 | 297 | 37 |
| 48 | 55 | 9 | 298 | 306 | 38 |
| 56 | 63 | 10 | 307 | 315 | 39 |
| 64 | 71 | 11 | 316 | 324 | 40 |
| 72 | 79 | 12 | 325 | 333 | 41 |
| 80 | 88 | 13 | 334 | 343 | 42 |
| 89 | 96 | 14 | 344 | 352 | 43 |
| 97 | 104 | 15 | 353 | 361 | 44 |
| 105 | 113 | 16 | 362 | 370 | 45 |
| 114 | 121 | 17 | 371 | 379 | 46 |
| 122 | 130 | 18 | 380 | 388 | 47 |
| 131 | 138 | 19 | 389 | 397 | 48 |
| 139 | 147 | 20 | 398 | 406 | 49 |
| 148 | 156 | 21 | 407 | 415 | 50 |
| 157 | 164 | 22 | 416 | 424 | 51 |
| 165 | 173 | 23 | 425 | 434 | 52 |
| 174 | 182 | 24 | 435 | 443 | 53 |
| 183 | 191 | 25 | 444 | 452 | 54 |
| 192 | 199 | 26 | 453 | 461 | 55 |
| 200 | 208 | 27 | 462 | 470 | 56 |
| 209 | 217 | 28 | 471 | 471 | 57 |
| 218 | 226 | 29 | 480 | 489 | 58 |
| 227 | 235 | 30 | 490 | 498 | 59 |
| 236 | 244 | 31 | 499 | 500 | 60 |

For samples greater than 500, the number of exceedances to place waters on the section 303(d) list shall be calculated using the following equation: Excel® function CRITBINOM(Number of samples, 0.10, 0.90) + 1.

4.3 TMDLs Completed List Factors

This section provides the methodology for development of the TMDL completed list. A water segment shall be placed on this list if the conditions for placement on the section 303(d) list (section 4.2) are met and both of the following additional conditions are met:

- A TMDL has been approved by USEPA for the pollutant-water segment combination.
- An implementation plan has been approved for the TMDL.

4.4 Enforceable Program List Factors

This section provides the methodology for development of the enforceable program list. Waters shall be placed on the enforceable program list if water quality standards are not met and there is an existing program being implemented to address the identified problem. A water segment shall be placed on this list if the conditions for placement on the section 303(d) list are met (section 4.2) and the all of the following additional conditions are met:

- For point sources, the discharge controls are enforceable. The control mechanism for nonpoint sources must be included in an agency-sponsored watershed plan or other programs that will obviate the need for a TMDL.
- The controls are specific to the water body and pollutant(s) of concern.
- If the enforceable program is a permit or waste discharge requirement, the majority of the pollutant loading is associated with the permitted source.
- The controls are in place or scheduled for implementation. Documentation shall include, but is not limited to: permits, waste discharge requirements, contracts, Superfund site remediation planning documents, or enforcement actions. Documentation that Best Management Practices (BMPs) will lead to attainment of water quality standards shall be based on site-specific study, case studies from other similar locations, or research results from applicable situations.
- The timeframe for implementation is established.
- The controls are sufficient to assess if water quality standards will be attained within a reasonable time. Documentation shall include an estimate of when attainment of water quality standards is expected. Acceptable timeframes for standards attainment are: (1) before next listing cycle, (2) within the life of the permit, (3) prior to renewal of the WDR, (4) within the compliance schedule, or (5) within the schedule presented in a watershed plan.
- Water quality standards attainment can be demonstrated through an existing monitoring program or a future monitoring program with reasonable assurance of implementation.

Control efforts that address one or more of the sources of pollutants that cause or contribute to the water quality standards not being met that do not address other contributing sources shall not be placed on the enforceable program list.

Water segments placed on this list shall be moved to the section 303(d) list if the implemented management measures are unsuccessful within the scheduled timeframe or if the program is not implemented as scheduled.

4.5 Pollution List Factors

This section provides the methodology for development of the pollution list. Habitat, channel, or flow modification may affect attainment of water quality standards under two circumstances: (1) situations where these factors cause direct impacts on beneficial uses, and (2) situations where these factors influence one or more water quality parameters and lead to impacts on beneficial uses.

Although habitat modification, channel modification, and flow modification may affect beneficial use attainment, there are no pollutant-specific water quality objectives for these factors in Basin Plans.

Water segments should be placed on the Pollution List if beneficial uses are impacted but the problem is not due to a pollutant. Waters should be placed on this list if they do not support beneficial uses due to one or more of the following factors:

- flow depletion from water diversions
- channel modifications such as concrete lining of the channel
- removal of riparian vegetation
- impacts from aquatic nuisance nonindigenous species

If a pollutant and a non-pollutant are implicated in an impact on beneficial uses, then the pollutant shall be assessed separately and, if water quality objectives are exceeded as described in section 4.2, the segment shall be placed on the section 303(d) list.

4.6 Standards Fully Attained List Factors

This section provides the methodology for development of the standards fully attained list. Water segments shall be placed on this list if any of the following conditions are met:

- Water quality monitoring data or information are available that shows all water quality standards are attained.
- Data are sufficient to show that the water segment does not trigger placement on the planning list (section 4.1) or the section 303(d) list (section 4.2) for all water quality standards.

4.7 Standards Partially Attained List Factors

This section provides the methodology for development of the standards partially attained list. Water segments shall be placed on this list if any of the following conditions are met:

- Water quality monitoring data or information is available that shows some water quality standards are attained.

- Data are sufficient to show that the water segment does not trigger placement on the planning list or the section 303(d) list.
- There is inadequate or no data and information to show that the remaining water quality standards are attained.

4.8 Monitoring List Factors

Waters shall be placed on this list if data and information are not available.

5 California De-Listing Factors

This section provides the methodology for removing waters from the planning list, section 303(d) list, enforceable program list, and TMDLs completed list.

All listings of water segments shall be reevaluated if the listing was based on faulty data. Faulty data include, but are not limited to, typographical errors, improper quality assurance/quality control procedures, or limitations related to the analytical methods that would lead to improper conclusions regarding the water quality status of the segment.

If objectives or standards have been revised and the site or water meets water quality standards, the water segment shall be removed from the section 303(d) list, enforceable program list, and TMDLs completed list. The listing of a segment shall be reevaluated if the water quality standard has been changed.

Water segments shall be placed on the standards fully attained list or standards partially attained list, as appropriate, if the following conditions are met:

5.1 Numeric Water Quality Objectives, Criteria, or Standards for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded in fewer than 10 percent of the samples with a confidence level of 90 percent using a binomial distribution¹⁸ (Table 5.1). The minimum sample size is 22.

5.2 Numeric Water Quality Objectives for Conventional Pollutants in Water

Numeric water quality objectives for conventional pollutants are exceeded in fewer than 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 5.1). The minimum sample size is 22.

5.3 Numeric Water Quality Objectives for Bacteria in Water

Numeric water quality objectives or standards for bacteria are exceeded in fewer than 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 5.1). The minimum sample size is 22.

5.4 Health Advisories

The health advisory used to list the water segment has been removed or the chemical or biological contaminant-specific evaluation guideline for tissue is no longer exceeded.

5.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

Numeric pollutant-specific evaluation guidelines are exceeded in fewer than 10 percent of the samples with a confidence level of 90 percent using a binomial distribution (Table 5.1). The minimum sample size is 22.

5.6 Water/Sediment Toxicity

Water/Sediment Toxicity or associated water or sediment quality guidelines are exceeded in fewer than 10 percent of concurrently collected samples with a confidence level of 90 percent using a binomial distribution (Table 5.1). The minimum sample size is 22.

5.7 Nuisance

The water segment no longer satisfies the conditions to be listed for nuisance condition or associated numerical water or sediment data meets any one of the following:

5.7.1.1 Nutrient-related

For excessive algae growth, unnatural foam, odor, taste, applicable numerical nutrient water quality objectives are not exceeded as described in sections 5.1 or 5.2.

5.7.1.2 Other Types

Applicable numerical water quality objectives or acceptable evaluation guidelines are not exceeded as described in sections 5.1 and 5.2 for color, oil sheen, turbidity, litter, trash, taste, or odor not related to nutrients. These types of nuisance shall also be removed from the list when there is no significant nuisance condition when compared to reference conditions.

5.8 Adverse Biological Response

Adverse Biological Response is no longer evident or associated water or sediment numeric pollutant-specific evaluation guidelines are exceeded in fewer than 10 percent of samples with a confidence level of 90 percent using a binomial distribution (Table 5.1). The minimum sample size is 22.

5.9 Degradation of Biological Populations and Communities

Biological Populations and Communities degradation is no longer evident or associated water or sediment numeric pollutant-specific evaluation guidelines are exceeded in fewer than 10 percent of samples with a confidence level of 90 percent using a binomial distribution (Table 5.1). The minimum sample size is 22.

5.10 Alternate Data Evaluation

For data and aspects of data (e.g., measurement magnitude) not otherwise addressed in any of the above sections or for situations where an individual line of evidence would not support the removal of a water on the section 303(d) list, waters shall be removed from the lists if water quality objectives are no longer exceeded providing that:

- The data and information are related to a pollutant or toxicity.
- Data meet quality assurance requirements (section 7.2.4).
- The measurements can be analyzed using a scientifically defensible procedure that provides an equivalent level of confidence as the factors in section 5.
- The data and information can be compared to applicable water quality objectives, water quality criteria, or numeric guidelines (section 7.2.3).
- If appropriate, the magnitude of the water quality objective or water quality criterion exceedance shall be considered.

- Corroborating evidence from independent lines of evidence show narrative water quality standards are attained.
- An alternative approach was used originally to place the water segment on the list (section 4.2.11).

Table 5.1: Maximum number of measured exceedances allowable to remove a water segment from the section 303(d) list with at least 90% confidence that the actual exceedance rate is less than 10 percent.

| Sample sizes | | Maximum number of exceedances allowable for delisting | Sample sizes | | Maximum number of exceedances allowable for delisting |
|--------------|-----|---|--------------|-----|---|
| From | To | | From | To | |
| 22 | 37 | 0 | 290 | 300 | 22 |
| 38 | 51 | 1 | 301 | 311 | 23 |
| 52 | 64 | 2 | 312 | 323 | 24 |
| 65 | 77 | 3 | 324 | 334 | 25 |
| 78 | 90 | 4 | 335 | 345 | 26 |
| 91 | 103 | 5 | 346 | 356 | 27 |
| 104 | 115 | 6 | 357 | 367 | 28 |
| 116 | 127 | 7 | 368 | 378 | 29 |
| 128 | 139 | 8 | 379 | 389 | 30 |
| 140 | 151 | 9 | 390 | 401 | 31 |
| 152 | 163 | 10 | 402 | 412 | 32 |
| 164 | 174 | 11 | 413 | 423 | 33 |
| 175 | 186 | 12 | 424 | 434 | 34 |
| 187 | 198 | 13 | 435 | 445 | 35 |
| 199 | 209 | 14 | 446 | 456 | 36 |
| 210 | 221 | 15 | 457 | 467 | 37 |
| 222 | 232 | 16 | 468 | 478 | 38 |
| 233 | 244 | 17 | 479 | 489 | 39 |
| 245 | 255 | 18 | 490 | 500 | 40 |
| 256 | 266 | 19 | | | |
| 267 | 278 | 20 | | | |
| 279 | 289 | 21 | | | |

For samples greater than 500, the number of allowable exceedances shall be calculated using the following equation:
Excel® function CRITBINOM(Number of samples, 0.10, 0.10) - 1.

6 Priority Setting and Scheduling

Waters on the section 303(d) list shall be ranked into high, medium, and low categories in order to set priority for development of TMDLs. The rankings shall be based on:

- Water body significance (such as importance and extent of beneficial uses, threatened and endangered species concerns, and size of water body).
- Degree that water quality objectives are not met or beneficial uses are not attained or threatened (such as the severity of the pollution or number of pollutants/stressors of concern) [40 CFR 130.7(b)(4)]. Higher priority shall be assigned to water segments that exceed standards by 40 percent or more for Group 1 pollutants or exceed standards by 20 percent or more for Group 2 pollutants.¹⁹
- Availability of funding and information to address the water quality problem.

For water on the section 303(d) list, RWQCBs shall develop a schedule for those waters needing a TMDL using the following categories:

1. Those waters given a high priority are targeted for TMDL completion in the next two years.
2. Medium priority to be completed within 5 years.
3. Low priorities will be completed in more than 5 years.

7 Policy Implementation

This section provides SWRCB guidance on implementation of this Policy.

7.1 Reassessment of the 2002 Section 303(d) List

Each water body and pollutant combination identified on the 2002 CWA section 303(d) list shall be reevaluated using the provisions of this Policy. In 2004, the reevaluation of the section 303(d) list shall include at least those listings identified as high priority.

Beginning with the next listing cycle, RWQCBs and the SWRCB shall begin to reassess the entire list. This reassessment shall take no longer than three listing cycles. The steps to complete the reassessment are:

- A. RWQCBs shall select waters to be reassessed during the listing cycle.
- B. All readily available data and information shall be used to assess a water segment. Data and information older than ten years may be used if the original listing was based on that data.
- C. In performing the reassessment the RWQCBs shall use the California Listing Factors (i.e., waters shall be assessed as if they had never been listed before) to assess each water segment-pollutant combination.
- D. Based on the evaluation of the data and information presented in the water body fact sheet, the reassessed waters shall be placed in the appropriate category in the California Integrated Water Quality Report.

Until the reevaluation is complete, waters not assessed on the 2002 section 303(d) list shall be carried forward to any revised list. After the reassessment, the newly completed section 303(d) list shall form the basis for any subsequent lists.

7.2 Process for Evaluation of Readily Available Data and Information

The RWQCBs and SWRCB shall use the following process to develop the Integrated Water Quality Report and the lists described above. The process has seven steps including:

- Definition of readily available data and information;
- Administration of the listing process;
- Evaluation guideline selection process;
- Data quality assessment process;
- Data quantity assessment process;
- RWQCB approval; and
- SWRCB approval.

7.2.1 Definition of Readily Available Data and Information

RWQCBs and SWRCB shall assemble and consider all readily available data and information. The data and information shall be reviewed in the following order: submittals resulting from the solicitation, selected data possessed by the RWQCBs, and

other sources. At a minimum, readily available data and information includes paper and electronic copies of:

- The most recent section 303(d) list, the most recent section 305(b) report, and the most recent California Integrated Water Quality Report;
- CWA section 319 nonpoint source assessments;
- Drinking water source assessments;
- Information on water quality problems in documents prepared to satisfy Superfund and Resource Conservation and Recovery Act requirements;
- Fish and shellfish advisories, beach postings and closures, or other water quality-based restrictions;
- Reports of fish kills, cancers, lesions or tumors;
- Dilution calculations, trend analyses, or predictive models for assessing the physical, chemical, or biological condition of streams, rivers, lakes, reservoirs, estuaries, coastal lagoons, or the ocean;
- Applicable water quality data and information from SWAMP, USEPA's Storage and Retrieval Database Access (STORET), the Bay-Delta Tributaries Database, Southern California Coastal Water Research Project, and the San Francisco Estuary Regional Monitoring Program; and
- Water quality problems and existing and readily available water quality data and information reported by local, state and federal agencies (including receiving water monitoring data from discharger monitoring reports), citizen monitoring groups, academic institutions, and the public.

7.2.2 Administration of the Listing Process

7.2.2.1 Solicitation of All Readily Available Data and Information

SWRCB and RWQCBs shall seek all readily available data and information on the quality of surface waters of the State. To do this, the RWQCBs shall solicit all data and information available including information available from the public. The SWRCB shall solicit all available data and information by gathering data and information from other state and federal agencies or groups that can provide data that are statewide in scope. The SWRCB information solicitation letter shall request that all parties having data and information pertaining to a specific Region should send the data and information directly to that RWQCB.

Readily available data and information shall be solicited from any interested party, including but not limited to: private citizens; public agencies; state and federal

governmental agencies; non-profit organizations; and businesses possessing data and information regarding the quality of the Region's waters.

In general, the SWRCB and RWQCBs shall seek all readily available data and assessment information generated since the last listing cycle. For purposes of data and information solicitation, information is any documentation describing the water quality condition of a surface water body. Data are considered to be a subset of information that consists of reports detailing measurements of specific environmental characteristics. The data and information may pertain to physical, chemical, and/or biological conditions of the Region's waters or watersheds.

Information solicited should contain the following:

- The name of the person or organization providing the information;
- Mailing address, telephone numbers, and email address of a contact person for the information provided;
- Two hard copies and an electronic copy of all information provided. The submittal must specify the software used to format the information and provide definitions for any codes or abbreviations used;
- Bibliographic citations for all information provided; and
- If computer model outputs are included in the information, provide bibliographic citations and specify any calibration and quality assurance information available for the model(s) used.

Data solicited should contain the following:

- Data in electronic form, in spreadsheet, database, or ASCII formats. The submittal should use the SWAMP data format and should define any codes or abbreviations used in the database.
- Metadata for the field data, i.e., when measurements were taken, locations, number of samples, detection limits, and other relevant factors.
- Metadata for any Geographical Information System data must be included. The metadata must detail all the parameters of the projection, including datum.
- A copy of the quality assurance procedures.
- Two hard copies of the data.
- Data from citizen volunteer water quality monitoring efforts require the name of the group and indication of any training in water quality assessment completed by members of the group.

Data and information previously submitted to RWQCBs, such as Discharge Monitoring Reports, shall not be solicited as the data and information are already available to RWQCBs.

7.2.2.2 RWQCB Fact Sheet Preparation

When data and information are available, each RWQCB shall prepare a standardized fact sheet for each water and pollutant/pollution combination that is proposed for inclusion in

the California Integrated Water Quality Report. Fact sheets shall present a description of the line(s) of evidence used to support each component of the weight of evidence approach. Fact sheets shall be prepared for all data and information solicited. If the data and information reviewed indicate standards are attained, a single fact sheet may address multiple water and pollutant combinations. Facts sheets are not required for waters placed on the monitoring list.

The fact sheets shall contain the following:

- A. Region
- B. Type of water body (Bay and Harbors, Coastal Shoreline, Estuary, Lake/Reservoir, Ocean, Rivers/Stream, Saline Lake, Tidal Wetlands, Freshwater Wetland)
- C. Name of water body segment (including Calwater watershed)
- D. Pollutant or type of pollution
- E. Medium (water, sediment, tissue, habitat, etc.)
- F. Water quality standards (copy applicable water quality standard, objective, or criterion from appropriate plan or regulation) including:
 - 1. Beneficial use affected
 - 2. Numeric water quality objective/water quality criteria plus metric (single value threshold, mean, median, etc.) or narrative water quality objective plus guideline(s) used to interpret attainment or non-attainment
 - 3. Antidegradation considerations (if applicable to situation)
 - 4. Any other provision of the standard used
- G. Brief Watershed Description (e.g., land use, precipitation patterns, or other factors considered in the assessment)
- H. Summary of numeric data
 - 1. Quality assurance assessment
 - 2. Methods used
 - 3. Spatial representation, area that beneficial use is affected or determined to be supported (including map)
 - 4. Temporal representation
 - 5. Site-specific information
 - 6. Age of data
 - 7. Effect of seasonality
 - 8. Events/conditions that might influence data evaluation (e.g., storms, flow conditions, laboratory data qualifiers, etc.)
 - 9. Number of samples
 - 10. Number of samples exceeding guideline or standard
 - 11. Source of or reference for data
- I. Summary of non-numeric data and information
 - 1. Types of observations
 - 2. Spatial representation, size affected (including map)
 - 3. Reference conditions (if appropriate)
 - 4. Temporal representation
 - 5. Site-specific information
 - 6. Age of information

7. Effect of seasonality
8. Events/conditions that might influence information evaluation (e.g., storms, flow conditions, laboratory data qualifiers, etc.)
9. Number of samples or observations
10. Number of samples or observations exceeding guideline or standard
11. Perspective on magnitude of problem
12. Numeric indices derived from qualitative data
13. Source of information
- J. Potential source of pollutant or pollution (the source category should be identified as specifically as possible)
- K. Program(s) addressing the problem, if known and any conditions of the enforceable program list met
- L. Data evaluation as required by Sections 4 or 5 of this Policy
- M. Recommendation
- N. Priority ranking (developed only for the section 303(d) list as required by Section 6 of this Policy).
- O. TMDL schedule (developed only for the section 303(d) list as required by Section 6 of this Policy).

7.2.3 Evaluation Guideline Selection Process

Narrative water quality objectives shall be evaluated using numerical evaluation guidelines. When evaluating narrative water quality objectives or beneficial use protection, RWQCBs and SWRCB shall identify numeric evaluation guidelines that represents standards attainment or beneficial use protection. The guidelines are not water quality objectives and should only be used for the purpose of developing the section 303(d) list and the other lists associated with the California Integrated Water Quality Report. This section supersedes any regional water quality control plan or water quality control policy to the extent of any conflict.

To select an evaluation guideline, the RWQCB or SWRCB shall:

- Identify the water body, pollutants, and beneficial uses;
- Identify the narrative water quality objectives or applicable water quality criteria;
- Identify the appropriate numeric evaluation guideline²⁰ that potentially represents water quality objectives attainment or protection of beneficial uses. Depending on the beneficial use and narrative standard, the following considerations should be used in the selection of evaluation guidelines:
 1. Sediment Quality Guidelines for Marine, Estuarine, and Freshwater Sediments: RWQCBs may select sediment quality guidelines that have been published in the peer-reviewed literature or by state or federal agencies. Acceptable guidelines include selected values: effects range-median,²¹ probable effects level,²² probable effects concentration,²³ and other sediment quality guidelines.²⁴ Only those sediment guidelines that are predictive of sediment toxicity shall be used (i.e.,

those guidelines that have been shown in published studies to be predictive of sediment toxicity in 50 percent or more of the samples analyzed).

2. Evaluation Guidelines for the Protection of Consumption of Fish and Shellfish: RWQCBs may select the most restrictive evaluation published by USEPA²⁵ or the Office of Environmental Health Hazard Assessment.²⁶ Maximum Tissue Residue Levels (MTRLs) shall not be used to evaluate fish or shellfish tissue data.
3. Evaluation Guidelines for Protection of Aquatic Life from Bioaccumulation of Toxic Substances: RWQCBs may select the evaluation values for the protection of aquatic life published by the National Academy of Science.²⁷
4. For other parameters, evaluation guidelines may be used if it can be demonstrated that the evaluation guideline is:
 - Applicable to the beneficial use
 - Protective of the beneficial use
 - Linked to the pollutant under consideration
 - Scientifically-based and peer reviewed
 - Well described
 - Previously used or specifically developed to assess water quality conditions of similar hydrographic units
 - Not more limiting than the natural background concentration (if applicable)
 - Identifies a range above which impacts occur and below which no or few impacts are predicted. For non-threshold chemicals, risk levels shall be consistent with comparable water quality objectives or water quality criteria.

Justification for alternate evaluation guidelines shall be presented in the water body fact sheet.

7.2.4 Data Quality Assessment Process

The quality of the data used in the development of the Integrated Report shall be of sufficiently high quality to make determinations of water quality standards attainment. Quantitative data are of little use unless accompanied by descriptions of sample collection, the analytical methods used, quality control protocols, and the degree to which data quality requirements are met.

Data supported by a Quality Assurance Project Plan (QAPP) pursuant to the requirements of 40 CFR 31.45 are acceptable for use in developing the Integrated Water Quality Report and the section 303(d) list. The data from major monitoring programs in California are considered of adequate quality. The major programs include SWAMP, the Southern California Bight Projects of the Southern California Coastal Water Research Project, U.S. Geological Survey, U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program, the Regional Monitoring Program of the San Francisco Estuary Institute, and the Bay Protection and Toxic Cleanup Program (BPTCP).

Numeric data are considered credible and relevant for listing purposes if the data set submitted meets the minimum quality assurance/quality control requirements outlined below. A QAPP or equivalent information must be available containing, at a minimum, the following elements:

- Objectives of the study, project, or monitoring program;
- Methods used for sample collection;
- Field and laboratory analysis;
- Data management procedures; and
- Personnel training.

A site-specific or project-specific sampling and analysis plan for numeric data must also be available containing:

- Data quality objectives or requirements of the project;
- Rationale for the selection of sampling sites, water quality parameters, sampling frequency and methods that assure the samples are spatially and temporally representative of the surface water and representative of conditions within the targeted sampling timeframe; and
- Information to support the conclusion that results are reproducible.

The RWQCBs shall clearly evaluate and make a finding in the fact sheets on the appropriateness of data collection and analysis practices. If any data quality objectives or requirements in the QAPP are not met, the reason for not meeting them and the potential impact on the overall assessment shall be clearly documented.

Data without rigorous quality control can be useful in combination with high quality data and information. If the data collection and analysis is not supported by a QAPP (or equivalent) or if it is not possible to tell if the data collection and analysis was supported by a QAPP (or equivalent), then the data and information cannot be used by itself to support listing or delisting of a water segment. These data may only be used to corroborate other data and information with appropriate quality assurance and quality control.

For narrative and qualitative submittals, the submission must:

- describe events or conditions that indicate impacts on water quality, and that are outside the expected natural range of conditions;
- provide linkage between the measurement endpoint (e.g., a study that may have been performed for some other purpose) and the water quality standard of interest;
- be scientifically defensible;
- provide analyst's credentials and training; and

- be verifiable by the SWRCB or RWQCB.

For photographic documentation, the submission must:

- identify the date;
- identify location on a general area map;
- either mark location on a USGS 7.5 minute quad map along with quad sheet name or provide location latitude/longitude;
- provide a thorough description of photograph(s);
- describe the spatial and temporal representation of the photographs;
- provide linkage between photograph-represented condition and condition that indicates impacts on water quality that are outside the expected natural range of conditions;
- provide photographer's rationale for area photographed and camera settings utilized; and
- be verifiable by SWRCB and RWQCB.

7.2.5 Data Quantity Assessment Process

Once the available data and information are assembled, RWQCBs shall implement the following considerations before determining if water quality standards are exceeded. The following considerations shall be documented in each water body fact sheet.

7.2.5.1 Water-body specific information

Data used to assess water quality standards attainment should be actual data that can be quantified and qualified. Information that is descriptive, estimated, modeled, or projected may be used as ancillary lines of evidence for listing or de-listing decisions. In order to be used in developing the lists:

- Data must be measured at one or more sites in the water segment;
- Environmental conditions in a water body or at a site must be taken into consideration (e.g., effects of seasonality, events such as storms, the occurrence of wildfires, land use practices, etc.); and
- The fact sheet shall contain a description of pertinent factors such as the depth of water quality measurements, flow, hardness, pH, the extent of tidal influence, and other relevant sample- and water body-specific factors.

7.2.5.2 Age of Data

Only the most recent 10-year period of data and information shall be used for listing and de-listing waters. Data older than 10 years may be used on a case-by-case basis if the older data are used in conjunction with newer data to demonstrate trends or if the conditions in a water body have not changed. In either case, the reason for using older data shall be described in the water body fact sheet. Older data must meet all data quality requirements presented in this Policy (Section 7.2.4).

7.2.5.3 Spatial Representation

Samples shall be collected to be representative of spatial characteristics of the water segment. To the extent possible, all samples should be collected to statistically represent the segment of the water body or collected in a consistent targeted manner that represents the segment of the water body.

Samples collected within 200 meters of each other shall be considered the same station or location. However, samples less than 200 meters apart may be considered to be spatially independent samples if justified in the water body fact sheet. Samples from mixing zones should not be included as part of the data set.

7.2.5.4 Temporal Representation

Samples shall be collected to be representative of temporal characteristics of the water body. Samples used in the assessment must be temporally independent. If the majority of samples were collected on a single day or during a single short-term natural event (e.g., a storm, flood, wildfire), the data shall not be used as the primary data set supporting the listing.

In general, samples should be available from two or more seasons or from two or more events when effects or water quality objectives exceedances would be expected to be clearly manifested.

Sampling ephemeral waters, during a specific season, or during human-caused events (except spills) should be used to assess significant pollutant-related exceedances of water quality standards. Timing of the sampling should include the critical season for the pollutant and applicable water quality standard. The water quality fact sheet should describe the significance of the sample timing.

7.2.5.5 Minimum Number of Samples

Generally, for assessment of numeric water quality standards or evaluation guidelines, a minimum of 10 or 20 temporally independent samples is needed from each water body segment for placement on the planning list or the section 303(d) list, respectively. Fewer samples may be used on a case-by-case basis if standards are exceeded frequently as described in the California Listing Factors.

For entire water bodies, comparable measurements (e.g., field measurements, constituents in water, sediment, or tissue) collected at multiple sites may be aggregated to meet the minimum requirement.

7.2.5.6 Aggregation of Data by Reach/Area

For some water bodies, Basin Plans define distinct water segments. At a minimum, data shall be aggregated by the water segments defined in the Basin Plans. In the absence of a Basin Plan segmentation system, the RWQCBs should consider defining distinct reaches based on hydrology (e.g., stream order, tributaries, dams, or channel characteristics) and relatively homogeneous land use. These components of the stream system can be logically grouped depending on the nature of the source of the pollutant or pollution and the designation of beneficial uses. Similarly, a lake or estuary can be divided into areas or

embayments based on circulation studies, water quality data and adjacent land uses or discharges.

If available data suggest that a pollutant may cause an excursion above a water quality objective, the RWQCB should identify land uses, subwatersheds, tributaries, or dischargers that could be contributing the pollutant to the water body. The RWQCBs should identify stream reaches or lake/estuary areas that may have different pollutant levels based on significant differences in land use, tributary inflow, or discharge input. Based on these evaluations of the water body setting, RWQCBs should aggregate the data by appropriate reach or area.

Data must be measured at one or more sites in the water segment in order to list. Data related to the same pollutant from two or more adjoining segments shall be combined provided that there is at least one measurement above the applicable water quality objective in each segment of the water body. The pooled data shall be analyzed together.

7.2.5.7 Natural Sources

If it is documented that natural conditions or processes cause a segment of a water body to be considered a water quality limited segment or a candidate for the planning list then the segment shall not be placed on the lists. Documentation must address the natural source(s) of the chemical and explain why human causes can be ruled out as the cause of the water quality limited segment. Human-caused sources (i.e., “waste” as defined in Water Code section 13050(d) or “pollution” as defined in Water Code section 13050(l) and 40 CFR 130.2(c)) can generally be ruled out where the excursions beyond objectives would occur in the absence of the human caused sources. This section supersedes any regional water quality control plan, statewide water quality control plan, or water quality control policy to the extent of any conflict.

7.2.5.8 Quantitation of Chemical Concentrations

When available data are less than or equal to the quantitation limit and the quantitation limit is less than or equal to the water quality standard:

- A. The value will be considered as meeting the water quality standard, objective, criterion, or evaluation guideline and
- B. One-half of the value of the quantitation limit shall be used in statistical analyses²⁸.

When the sample value is less than the quantitation limit and the quantitation limit is greater than the water quality standard, objective, criterion, or evaluation guideline, the result shall not be used in the analysis.²⁹

The quantitation limit includes the minimum level, practical quantitation level, or reporting limit.

7.2.5.9 Transformation of data consistent with the expression of numeric water quality objectives, water quality criteria, or evaluation guidelines

If the water quality objectives, criteria, or guidelines state a specific averaging period and/or mathematical transformation, the data should be transformed in a consistent manner prior to conducting the list assessments. If sufficient data are not available for

the stated averaging period, the available data shall be used to represent the averaging period.

To be considered temporally independent, samples collected during the averaging period shall be combined and considered one sampling event. For data that is not temporally independent (e.g., when multiple samples are collected at a single location on the same day), the measurements shall be combined and represented by a single resultant value.

The statistical measure to represent the dataset not temporally independent shall be determined by the water quality standard, objective, criterion, or guideline as follows:

- A. The measure of central tendency for the dataset used to evaluate the exceedance of a water quality standard, objective, criterion, or evaluation guideline such as:
 - i. annual average
 - ii. Four-day average
 - iii. 24 hour average
 - iv. 1 hour average
 - v. Median
 - vi. Geometric mean
- B. The maximum value or worst case value of the dataset used to evaluate an exceedance of the following types of water quality standards, objectives, criteria, or evaluation guidelines such as:
 - i. Acute water quality criteria
 - ii. Single sample maximum water quality objectives or criteria
 - iii. For dissolved oxygen measurements, the worst case value is the minimum value
 - iv. For pH measurements, the worst case is the minimum and maximum values of the data set.
- C. The appropriate percentiles stated for the water quality objective or criterion.
- D. If the averaging period is not stated for the standard, objective, criterion, or evaluation guideline, then the samples collected less than 7 days apart shall be averaged.

7.2.5.10 Binomial Model Statistical Evaluation

Once data have been summarized, RWQCBs shall determine if standards are exceeded. The RWQCBs shall determine for each averaging period which data points exceed water quality standards. The number of measurements that exceed standards shall be reported in the water body fact sheet.

When numerical data are evaluated, all of the following steps shall be completed:

- A. For each data point representing the averaging period, the RWQCB shall answer the question: Are water quality standards met?

- B. If the measurement is greater than the water quality standard, objective, criterion, or evaluation guideline, then the standard is considered exceeded.
- C. Sum the number exceeding the standard, objective, criterion, or evaluation guideline.
- D. Sum the total number of measurements (sample population).
- E. Compare the result to the appropriate table (i.e., Tables 4.1, 4.2, or 5.1).
- F. Report the result of this comparison in the water body fact sheet.

7.2.5.11 Evaluation of Bioassessment Data

When evaluating biological data and information, RWQCBs shall:

- Identify appropriate reference sites within water segments, watersheds, or ecoregions. Document methods for selection of reference sites.
- Evaluate bioassessment data at reference sites using water segment-appropriate method(s) and index period(s). Document sampling methods, index periods, and Quality Assurance/Quality Control (QA/QC) procedures for the habitat being sampled and question(s) being asked.
- Evaluate bioassessment data from other sites, and compare to reference conditions. Evaluate physical habitat data and other water quality data, when available, to support conclusions about the status of the water segment.
- Calculate biological metrics for reference sites and develop Index of Biological Integrity (IBI) if possible.

7.2.5.12 Evaluation of Temperature Data

Temperature water quality objectives shall be evaluated as described in sections 7.2.5.1 through 7.2.5.10. When “historic” or “natural” temperature data are not available, alternative approaches shall be employed to assess temperature impacts.

In the absence of necessary data to interpret numeric water quality objectives, recent temperature monitoring data shall be compared to the temperature requirements of aquatic life in the water segment. In many cases, fisheries, particularly salmonids, represent the beneficial uses most sensitive to temperature. Information on the current and historic condition and distribution of the sensitive beneficial uses (e.g., fishery resources) in the water segment is necessary, as well as recent temperature data reflective of conditions experienced by the most sensitive life stage of the aquatic life species. If temperature data from past (historic) periods corresponding to times when the beneficial use was fully supported are not available, information about presence/absence or abundance of sensitive aquatic life species shall be used to infer past (historic) temperature conditions if loss of habitat, diversions, toxic spills, and other factors are also considered.

Determination of life stage temperature requirements of sensitive aquatic life species shall be based on peer-reviewed literature. Similarly, evaluation of temperature data shall be based on temperature metrics reflective of the temperature requirements for the sensitive aquatic life species. For example, a common metric for assessing chronic (i.e., sub-lethal) effects on salmonids is the maximum weekly average temperature (MWAT), the highest value of the 7-day moving average of temperature. The MWAT of a particular water body can be compared to MWAT growth requirements for salmonids. Another measure of temperature requirements is the upper lethal limit, an acute temperature threshold. These thresholds vary for different species and for different ranges of species, and should be determined based on peer-reviewed literature.

7.3 RWQCB Approval

At a public hearing, RWQCB shall consider each proposed water body fact sheet. After receiving testimony, RWQCB shall develop written responses to all comments. After consideration of all testimony, RWQCBs shall approve recommendations for the section 303(d) list and other lists included in the California Integrated Water Quality Report. RWQCBs shall submit to SWRCB the water body fact sheets, responses to comments, documentation of the hearing process, and a copy of all data and information considered.

7.4 SWRCB Approval

SWRCB shall evaluate RWQCB-developed water body fact sheets for completeness, consistency with this Policy, and consistency with applicable law. The SWRCB shall assemble the fact sheets and consolidate all the RWQCB lists into the California Integrated Water Quality Report.

Before the adoption of the California Integrated Water Quality Report, the SWRCB shall hold a public workshop. Advance notice and opportunity to comment shall be provided. Comments shall be limited to the issues raised before the RWQCBs. Subsequent to the workshop, the SWRCB shall approve the section 303(d) list and the California Integrated Water Quality Report at a Board Meeting. The approved California Integrated Water Quality Report and the supporting fact sheets shall be submitted to USEPA for approval as required by the Clean Water Act.

8 Endnotes

The following endnotes provide brief explanations for several provisions of the draft Policy. More detail justifications for the provisions of the Policy are being developed and will be included in the Functional Equivalent Document that supports the development of the Policy.

¹ Page 1, section 1, paragraph 2: Water quality standards consist of designated beneficial uses for state waters, state-adopted water quality objectives or federally-promulgated criteria to protect those uses, and an antidegradation policy. Water quality objectives or criteria can be either numeric or narrative. In addition, USEPA has promulgated criteria for toxic pollutants that supplement existing state water quality standards. Regional water quality control plans (basin plans) contain designated beneficial uses, water quality objectives, and an implementation program to achieve objectives. Applicable statewide plans and policies include, but are not limited to, the State Policy for Implementation of Toxics Standards in Inland Surface Waters, Enclosed Bays, and Estuaries; California Ocean Plan, the Thermal Plan, and State Water Resources Control Board Resolution 68-16. U.S. EPA's criteria for toxic pollutants are found in the California Toxics Rule. Applicable standards are also promulgated by the California Department of Health Services.

² Page 1, section 1, paragraph 4: USEPA has recommended the use of statistical procedures to make determinations about standards attainment (USEPA. 2002. Consolidated Assessment and Listing Methodology. Toward a Compendium of Best Practices. First Edition. Office of Wetlands, Oceans, and Watersheds. U.S. Environmental Protection Agency, Washington, DC). USEPA has also developed guidance to support decision making when data are being used to select between two alternative conditions such as compliance or non-compliance with a standard (USEPA. 2000. Guidance of the Data Quality Objectives Process. EPA QA/4. Office of Environmental Information. U.S. Environmental Protection Agency. Washington DC). The state of Florida has used a nonparametric statistical approach to make listing and delisting determinations (Lin, P.E., D. Meeter, and X.F. Niu. 2000. A nonparametric procedure for listing and delisting impaired waters based on criterion exceedances. Technical report submitted to the Florida Department of Environmental Protection). Several other states are using similar approaches (e.g., Arizona, Kansas, Nebraska, Texas, and Washington).

³ Page 2, section 2, paragraph 1: The integration of the CWA section 303(d) and 305(b) requirements has been recommended by USEPA in guidance to the states (USEPA. 2001. 2002 Integrated Water Quality Monitoring and Assessment Report Guidance. Memorandum from Office of Wetlands, Oceans and Watersheds, U.S. Environmental Protection Agency. 11 pp. + 2 appendices). Several states have also used a planning list or preliminary list as recommended by the National Research Council (NRC. 2001. Assessing the TMDL Approach to Water Quality Management. Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution

Reduction, Water Science and Technology Board. National Academy Press, Washington, DC).

⁴ Page 3, section 3: The categories of waters recommended for the California Integrated Water Quality Report correspond to the categories recommended by USEPA in the Integrated Report Guidance (USEPA. 2001. 2002 Integrated Water Quality Monitoring and Assessment Report Guidance. Memorandum from Office of Wetlands, Oceans and Watersheds, U.S. Environmental Protection Agency. 11 pp. + 2 appendices) as follows:

Categories

USEPA Guidance

Category 1
Category 2
Category 3
Category 4A
Category 4B
Category 4C
Category 5

California Integrated Report

Standards Fully Attained List
Standards Partially Attained List
Planning List and Monitoring List
TMDLs Completed List
Enforceable Program List
Pollution List
Section 303(d) List of Water Quality
Limited Segments

⁵ Page 4, section 3.1.3.3: As used in this Policy, “pollution” is defined as the man-made or man-induced alternation of the chemical, physical, biological, and radiological integrity of water (33 USC section 1362).

⁶ Page 6, section 4, paragraph 1: The weight-of-evidence approach used in this policy is a process where individual lines of evidence are evaluated separately and combined in order to make a stronger inference about water quality standards attainment. Lines of evidence are data or information that pertains to an important aspect of a water body. In many cases, a single line of evidence is *sufficient by itself* to demonstrate water quality standards attainment. In other situations and with many data types, multiple lines of evidence are needed to arrive at a determination of whether standards are attained. In some instances, the available lines of evidence may conflict and make it difficult or impossible to determine if water quality standards are attained.

The weight-of-evidence approach follows a two-step process to accommodate the variety of data that might be encountered. The first step is to screen the available data and information for comparison with numeric water quality objectives using the binomial distribution that are *sufficient by themselves* to demonstrate standards attainment (e.g., sections 4.2.1, 4.2.2, and 4.2.3). The second step is to consider the available data and information using a variety of listing factors that require multiple lines of evidence for listing. The listing factors that require multiple lines of evidence are: (1) Health Advisories (section 4.2.4), (2) Toxicity (section 4.2.6), (3) Nuisance condition (section 4.2.7), (4) Adverse Biological Response (section 4.2.8), (5) Degradation of Biological Populations or Communities (section 4.2.9) and (6) Trends in Water Quality (section 4.2.10).

While most lines of evidence are addressed by the California Listing Factors there may be circumstances when additional lines of evidence may compel RWQCBs to conclude waters should be placed on the section 303(d) list. The weight-of-evidence approach specifies the use of specific approaches to evaluate data and information but also allows for the use of additional lines of evidence, alternate data analysis procedures, and alternate exceedance frequencies depending on site-specific factors (section 4.2.11).

⁷ Page 6, section 4.1, paragraph 2: This timeframe was selected to increase the likelihood that waters placed on the lists will be based on data representative of the water's current conditions. Shorter timeframes may preclude the use of some data and information that may not be published until the peer review process is completed. In some instance the review and publication process can take many years.

⁸ Page 6, section 4.1.1: In scientific research it is customary for scientists to pre-select a level of statistical confidence desired (normally from 90 to 99 percent) in order to minimize the chance of "Type I" errors ("false positive" mistakes) that may occur when the status quo hypothesis is wrongly rejected in favor of an alternate explanation. The less certain 80 percent confidence level is to be used for placing waters on the planning list to include waters where there might be problems, but one cannot be (at least 90 percent) sure. This lower confidence is acceptable because the consequence of being placed on the planning list is less costly/severe—only additional monitoring is required. Emerging and more subtle problems are more likely to be identified with a lower confidence level. However, the risk is an increase in Type I errors, i.e., supposed problems will be identified more frequently when in fact they may not exist. Fortunately, the required monitoring will help identify and eliminate such mistakes.

⁹ Page 6, section 4.1.1: A binomial distribution describes the likely chances for particular combinations of outcomes, in sequences of observations where only two results for any one observation are possible (e.g., yes/no, on/off, exceed/do not exceed). These mathematical-statistical calculations are useful for identifying and reliably quantifying types of errors inherent in decisions based on binomial sampling data. The likelihood of making decision errors is determined with "hypothesis testing"—sample data are used to choose between the baseline condition ("null hypothesis") and an alternative condition ("alternate hypothesis").

¹⁰ Page 6, section 4.1.3: The listing factor for bacteria is based on the recommendations of the Beach Water Quality Workgroup (BWQW). This group has members from State and local public health agencies, SWRCB and RWQCB staff, the regulated community, and an environmental group. The environmental group provided a minority report disagreeing with several of the BWQW recommendations. The use of binomial statistics was not a recommendation of the BWQW.

¹¹ Page 7, section 4.1.3, paragraph 1: Noble, R., et al. 1999. Southern California Bight 1998 Regional Monitoring Program: I. Summer Shoreline Microbiology. Southern California Coastal Water Research Project.

¹² Page 11, section 4.2.1: A binomial distribution describes the likely chances for particular combinations of outcomes, in sequences of observations where only two results for any one observation are possible (e.g., yes/no, on/off, exceed/do not exceed). These mathematical-statistical calculations are useful for identifying and reliably quantifying types of errors inherent in decisions based on binomial sampling data. The likelihood of making decision errors is determined with “hypothesis testing” —sample data are used to choose between the baseline condition (“null hypothesis”) and an alternative condition (“alternate hypothesis”). For placement on the section 303(d) list, the baseline condition is: Standards are not exceeded in more than 10 percent of the samples. The alternative condition is: Standards are exceeded in greater than 10 percent of the samples. The statistical test (in this case calculations based on the binomial distribution) is used to show either (1) there is insufficient evidence to indicate standards are met (and therefore, accept the baseline condition as true), or (2) the baseline condition is false (and therefore, the alternative condition may be true). A false rejection decision error (also called “false positive” or Type I error) occurs when it is concluded that standards are not met when standards really are met. A false acceptance decision error (also called “false negative” or Type II error) occurs when one concludes that standards are met when in fact they are not met.

Confidence Levels: Statistical “confidence” is equal to one (or 100 percent) minus the Type I error rate (e.g., $100\% - 5\% = 95\%$). Scientists customarily use 90, 95, or 99 percent confidence levels (= 10%, 5%, or 1% Type I error rates) to reasonably avoid false rejection type errors. (Type II or false acceptance errors are controlled by increasing sample size and by choosing an appropriate statistical test.) Any statistical conclusion that has a confidence level of less than 90 percent is considered not acceptable by most statisticians (Lin, P.E., D. Meeter, and X.F. Niu. 2000. A nonparametric procedure for listing and delisting impaired waters based on criterion exceedances. Technical report submitted to the Florida Department of Environmental Protection). The 90 percent confidence level is recommended for listing in order to balance the two types of errors (Types I and II) when sample sizes are expected to remain relatively small (e.g., <30) and the consequences of being placed on the section 303(d) list may be significant and/or costly. Greater (e.g., than 80%) confidence is necessary for placement on the section 303(d) list in order to reduce the chance of inappropriately requiring the development and implementation of a TMDL (and associated expenditures) when in fact the TMDL is not necessary (the Type I error).

Exceedance Frequency. U.S. EPA guidelines for water quality assessments (USEPA. 1997. Guidelines for preparation of the comprehensive state water quality assessments (305(b)) reports and electronic updates. Office of Water. EPA-841-B-97-002A and EPA-841-B-97-002B) allows a water to be listed if a percentage of the samples from that water do not meet water quality standards. While there is considerable debate over which value to select, USEPA has recommended in various documents exceedance rates ranging from <1 percent to 25 percent depending on the parameter, stringency desired, and level of certainty being described. This percentile approach has been used to limit excessive

pollutant levels while recognizing it may not be reasonable to not allow any standards violations. Many exceedances could be due to natural variability (including sample frame selection, sampling unit definition, and numbers of samples) and measurement error (including sample collection, sample handling, and analysis) and not due to a real violation of the standard. The possibility of these decision errors occurs because decisions are based on sample data that are incomplete and never perfect. Natural variability can be substantial but is rarely known explicitly. Measurement error is more readily quantified and well-run monitoring programs set limits on the amount of acceptable measurement error. Typical allowable variation for the measurement of metals and organics range from 10 to 30 percent and 40 percent for toxicity measurements. Consequently, as the number of samples that exceed standards gets smaller, at some point the decision to list becomes “too close to call.” As the exceedance rate (the gray area where the decision may be too close to call) decreases, fewer sample exceedances are required to place waters on the list. Conversely, for delisting, as exceedance rate decreases, the number of samples that show standards are met increases.

The decision on where to set the exceedance rate should balance the cost and need for large numbers of samples with the potential consequences of choosing the wrong course of action. Selecting a single value, in the absence of a site-specific value, is pragmatic, fair, and within the limits of the water quality regulatory process. Based on the types of monitoring efforts that have been implemented in California (e.g., NPDES, SWAMP, USEPA, etc.), the types of data sets available, past practice of the SWRCB and many RWQCBs, and the consequence of being placed on the list, a 10 percent exceedance rate is reasonable in the absence of a site-specific value.

¹³ Page 11, section 4.2.1: With sample sizes greater than 20, binomial distribution exhibits satisfactory false acceptance (Type II) error rates compared with other statistical approaches (Smith, E. P., K. Ye, C. Hughes, and L. Shabman. 2001. Statistical assessment of violations of water quality standards under section 303(d) of the Clean Water Act. *Environ. Sci. & Technol.* 35(3):606-612). The higher false rejection error (Type I) is acceptable because the required minimum number of exceedances has been reached.

¹⁴ Page 11, section 4.2.3: The listing factor for bacteria is based on the recommendations of the Beach Water Quality Workgroup (BWQW). This group has members from State and local public health agencies, SWRCB and RWQCB staff, the regulated community, and an environmental group. The environmental group provided a minority report disagreeing with several of the BWQW recommendations. The use of binomial statistics was not a recommendation of the BWQW.

¹⁵ Page 11, section 4.2.3: Noble, R., et al. 1999. Southern California Bight 1998 Regional Monitoring Program: I. Summer Shoreline Microbiology. Southern California Coastal Water Research Project.

¹⁶ Page 12, section 4.2.5, paragraph 1: At sample sizes greater than 20, the binomial model exhibits acceptable false rejection error rates in comparison to other approaches (Smith, E. P., K. Ye, C. Hughes, and L. Shabman. 2001. Statistical assessment of violations of water quality standards under section 303(d) of the Clean Water Act. *Environ. Sci. & Technol.* 35(3):606-612). In this case, only 10 samples are required because measurements of bioaccumulation (and other parameters such as sediment quality) are more persistent and integrative of water quality conditions and longer periods of time than measurements of water. Consequently, a higher false acceptance error is acceptable and appropriate for these parameters.

¹⁷ Page 14, section 4.2.10: This section should be used to evaluate compliance with the antidegradation component of water quality standards. Water quality standards include existing and designated beneficial uses, narrative and numeric water quality objectives, and the antidegradation considerations expressed in the state Nondegradation Policy (SWRCB Resolution 68-16) and federal regulations (40 CFR section 131.12).

¹⁸ Page 19, section 5.1: For removal from the section 303(d) list, the baseline condition is: Standards are not met in greater than or equal to 10 percent of the samples. The alternative condition is: Standards are not met in less than 10 percent of the samples. The binomial distribution is used to show either (1) there is insufficient evidence to indicate standards are not met (and therefore, accept the baseline condition as true), or (2) the baseline condition is false (and therefore, the alternative condition is true). Note that a greater sample population is needed in order to have the same level of confidence that the actual exceedance rate is less than 10 percent. This is opposed to an actual exceedance percentage greater than 10 percent, which is a bigger range that would require fewer samples (Lin, P.E., D. Meeter, and X.F. Niu. 2000. A nonparametric procedure for listing and delisting impaired waters based on criterion exceedances. Technical report submitted to the Florida Department of Environmental Protection).

¹⁹ Page 22, section 6: Group 1 and 2 pollutants are defined in the SWRCB Water Quality Enforcement Policy.

²⁰ Page 27, section 7.2.3, bullet 3: The references included in endnotes 21 through 27 contain many evaluation guidelines that are acceptable. Please note that several of the guidelines in the documents do not satisfy the conditions presented in this section (e.g., the ERMs for nickel and DDT).

²¹ Page 27, section 7.2.3, number 1: Long, E.R., D.D. MacDonald, S.L. Smith, and F.L. Calder. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. *Environ. Manag.* 19: 81-97.

²² Page 27, section 7.2.3, number 1: MacDonald, D.D., R.S. Carr, F.D. Calder, E.R. Long, and C.G. Ingersoll. 1996. Development and evaluation of sediment quality guidelines for Florida coastal waters. *Ecotoxicology*. 5: 253-278.

²³ Page 27, section 7.2.3, number 1: MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Arch. Environ. Contam. Toxicol.* 39: 20-31.

²⁴ Page 27, section 7.2.3, number 1: PTI Environmental Services. 1991. Pollutants of concern in Puget Sound. EPA 910/9-91-003. U.S. Environmental Protection Agency, Seattle, WA.

Long, E.R. and L.G. Morgan. 1990. The potential for biological effects of sediment-sorbed contaminants tested in the national Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. National Oceanic and Atmospheric Administration, Seattle, WA.

U.S. Environmental Protection Agency. 1993. Technical basis for establishing sediment quality criteria for nonionic contaminants for the protection of benthic organisms using equilibrium partitioning. EPA 822-R-93-011. Office of Science and Technology, Washington, DC.

MacDonald, D.D., L.M. Pinto, J. Fields, C.G. Ingersoll, E.R. Long, and R.C. Swartz. 2000. Development and evaluation of consensus-based sediment effect concentrations or polychlorinated biphenyls. *Environ. Toxicol. Chem.* 19: 1403-1413.

²⁵ Page 28, section 7.2.3, number 2: USEPA. 2000. Guidance for assessing contaminant data for use in advisories, Volume 1, Fish sampling and analysis, Third Edition, USEPA 823-B-00-007.

²⁶ Page 28, section 7.2.3, number 2: Brodberg, B. and G. Pollock. 1999. Prevalence of selected target chemical contaminants in sport fish from two California lakes: public health designed screening study, CalEPA, OEHHA, EPA Assistance Agreement No. CX 825856-01-0.

²⁷ Page 28, section 7.2.3, number 3: National Academy of Sciences-National Academy of Engineering. 1973. Water Quality Criteria 1972 (Blue Book). USEPA Ecological Research Series. EPA-R3-73-033. U.S. Environmental Protection Agency, Washington, D.C.

²⁸ Page 32, section 7.2.5.8, paragraph 1: One-half of the quantitation limit is a compromise between assuming (1) the chemical concentration actually present in the sample is equal to the quantitation limit and (2) the chemical concentration is equal to zero. This method is computationally simple and adequate if the detection frequency is 80 percent or more (Gibbons, R.D. and D.E. Coleman. 2001. *Statistical Methods for Detection and Quantification of Environmental Contamination*. John E. Wiley & Sons, Inc. New York).

²⁹ Page 32, section 7.2.5.8, paragraph 2: When the quantitation limit is above the water quality objective or criterion and the measurement is below the quantitation limit, it cannot be determined if the objective or criterion is attained. If the measurement is greater than or equal to the quantitation limit the value can be reported as a measurement; if the measurement is less than the quantitation limit it is dubious if the value should be used for comparison or computation (Gibbons, R.D. and D.E. Coleman. 2001. Statistical Methods for Detection and Quantification of Environmental Contamination. John E. Wiley & Sons, Inc. New York).